

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
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2. PREAMBLE

- a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."
- b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

- a. ISSUED TO (*Name and Address*)
Westinghouse Electric Company
LLC (WELCO)
P.O. Box 355
Pittsburgh, PA 15230
- b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
Westinghouse Electric Corporation application
dated August 29, 2006, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

- (1) Model Nos.: MCC-3, MCC-4, and MCC-5
- (2) Description

The MCC packages are shipping containers for unirradiated uranium oxide fuel assemblies. The packagings consist of a steel fuel element cradle assembly equipped with a strongback and an adjustable fuel element clamping assembly. The cradle assembly is shock mounted to a 13-gauge carbon steel outer container by shear mounts. The MCC-3 container is closed with thirty ½-inch T-bolts. The MCC-4 and MCC-5 containers are closed with fifty ½-inch T-bolts.

The MCC-3 and MCC-4 containers are permanently equipped with vertical Gd₂O₃ neutron absorber plates that are mounted on the center wall of the strongback. Additional horizontal Gd₂O₃ neutron absorber plates, mounted on the underside of the strongback, are required for the contents as specified.

The MCC-5 container is permanently equipped with both the vertical and horizontal Gd₂O₃ neutron absorber plates. Additional vee-shaped, guided Gd₂O₃ neutron absorber plates are required for the contents as specified.

Approximate dimensions of the MCC-3 packaging are 44½ inches O.D. by 194½ inches long. The gross weight of the packaging and contents is 7,544 pounds. The maximum weight of the contents is 3,300 pounds.

Approximate dimensions of the MCC-4 packaging are 44½ inches O.D. by 226 inches long. The gross weight of the packaging and contents is 10,533 pounds. The maximum weight of the contents is 3,870 pounds.

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5. (a) (2) Packaging (continued)

Approximate dimensions of the MCC-5 packaging are 44½ inches O.D. by 226 inches long. The gross weight of the packaging and contents is 10,533 pounds. The maximum weight of the contents is 3,700 pounds.

(3) Drawings

The MCC-3 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL301, Sheets 1, 2, 3, and 4, Rev. 6.

The MCC-4 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL401, Sheets 1, 2, 3, 4, and 5, Rev. 9.

The MCC-5 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL501, Sheets 1 through 10, Rev. 6.

(b) Contents

(1) Type and form of material

Unirradiated PWR uranium dioxide fuel assemblies with a maximum uranium-235 enrichment of 5.0 weight percent with the following exceptions: 15x15 BW fuel assemblies have a maximum enrichment of 4.65 wt%, and VVER-1000 fuel assemblies have a maximum enrichment of 4.80 wt%.

The fuel assemblies shall meet the specifications given in Westinghouse Drawing No. 6481E15, Rev. 4, and in the following tables of Appendix 1-5 of the application, as supplemented:

Table 1-5.1, Rev. 12*	Fuel Assembly Parameters 14x14 Type Fuel Assemblies
Table 1-5.2, Rev. 12*	Fuel Assembly Parameters 15x15 Type Fuel Assemblies
Table 1-5.3, Rev. 12*	Fuel Assembly Parameters 16x16 Type Fuel Assemblies**
Table 1-5.4, Rev. 12*	Fuel Assembly Parameters 17x17 Type Fuel Assemblies**
Table 1-5.5, Rev. 12*	Fuel Assembly Parameters VVER-1000 Type Fuel Assembly***

* As submitted by letter dated January 24, 2007.

** 16x16 CE fuel assemblies and the 17x17 W-STD/XL fuel assemblies shall be shipped only in the Model No. MCC-4 package.

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5. (b) (1) Contents (continued)

*** VVER-1000 fuel assemblies shall be shipped only in the Model No. MCC-5 package.

(2) Maximum quantity of material per package

Two (2) fuel assemblies

(c) Transport Index for Criticality Control (Criticality Safety Index)

Minimum transport index to be shown on
label for nuclear criticality control: 0.4

6. (a) For shipments of 14x14, 15x15, 16x16, and 17x17 OFA fuel assemblies with U-235 enrichments of over 4.65 wt% and up to 5.0 wt%, horizontal Gd_2O_3 neutron absorber plates shall be positioned underneath each assembly. The horizontal absorber plates shall be placed horizontally on the underside of the strongback, as specified in the respective drawings in Condition 5(a)(3) for the MCC-3 and MCC-4 models.
- (b) For shipments of 17x17 STANDARD lattice fuel assemblies (17x17 STD and 17x17 XL) with U-235 enrichments of over 4.85 wt% and up to 5.0 wt%, horizontal Gd_2O_3 neutron absorber plates shall be positioned underneath each assembly. The horizontal absorber plates shall be placed horizontally on the underside of the strongback, as specified in the respective drawings in Condition 5(a)(3) for the MCC-3 and MCC-4 models.
7. Shipments of VVER-1000 fuel assemblies are authorized with U-235 enrichments up to 4.80 wt%.
8. Each fuel assembly must be unsheathed or must be enclosed in an unsealed plastic sheath which may not extend beyond the ends of the fuel assembly. The ends of the sheath may not be folded or taped in any manner that would prevent flow of liquids into or out of the sheathed fuel assembly.
9. The dimensions, minimum Gd_2O_3 loading and coating specifications, and acceptance testing of the neutron absorber plates shall be in accordance with the "Gd₂O₃ Neutron Absorber Plates Specifications," Appendix 1-7, Rev. 12, of the application, as supplemented. The minimum Gd_2O_3 coating areal density on the vertical and horizontal neutron absorber plates shall be 0.054 g-Gd₂O₃/cm². The minimum Gd_2O_3 coating areal density on guided neutron absorber plates shall be 0.027 g-Gd₂O₃/cm².
10. In addition to the requirements of Subpart G of 10 CFR Part 71:
- (a) Each package shall be prepared for shipment and operated in accordance with the "Routine Shipping Container Utilization Summary Operating Procedures," in Chapter 7 of the application, as supplemented; and
- (b) Each package shall be tested and maintained in accordance with the "Acceptance Tests, Maintenance Program, and Recertification Program," in Chapter 8 of the application, as supplemented, and as specified in the respective drawings in Condition 5(a)(3) for the MCC-3, MCC-4, and MCC-5 models.

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11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.
12. Revisions No. 14 of this certificate may be used until January 31, 2008.
13. Expiration date: March 31, 2012.

REFERENCES

Westinghouse Electric Corporation application dated August 29, 2006.

Supplement dated: September 25, November 9, 2006, and January 24, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



Meraj Rahimi, Acting Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: February 2, 2007



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION REPORT

Docket No. 71-9239
Model Nos. MCC-3, MCC-4, and MCC-5
Certificate of Compliance No. 9239
Revision No. 15

SUMMARY

By application dated August 29, 2006, as supplemented by letters dated September 25, 2006, November 9, 2006, and January 24, 2007, Westinghouse Electric Company, LLC (the applicant) requested an amendment to Certificate of Compliance (CoC) No. 9239, for its Model Nos. MCC-3, MCC-4, and MCC-5 shipping containers. The applicant requested CoC No. 9239 be amended to: (1) renew it for a term of five years, (2) change the loading pattern for the 15x15 BW fuel assemblies, and (3) change the specification of the VVER-1000 fuel assemblies to include annular pellets at the ends of the active fuel region. The applicant, to support its request, submitted a consolidated safety analysis report (SAR).

The applicant made its request for renewal in a timely manner. The certificate has been renewed for a five year term. In addition, based on the statements and representations in the application, the staff finds that the other changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

EVALUATION

By application dated August 29, 2006, as supplemented by letters dated September 25, 2006, November 9, 2006, and January 24, 2007, the applicant requested an amendment to Certificate of Compliance (CoC) No. 9239, for its Model Nos. MCC-3, MCC-4, and MCC-5 shipping containers. The applicant requested CoC No. 9239 be amended to: (1) renew it for a term of five years, (2) change the loading pattern for the 15x15 BW fuel assemblies, and (3) change the specification of the VVER-1000 fuel assemblies to include annular pellets at the ends of the active fuel region. The applicant, to support its request, submitted a consolidated safety analysis report (SAR).

The applicant, in support of its request for certificate renewal, provided a consolidated application as specified in 10 CFR 71.38(c). The staff reviewed the consolidated application and concluded that the application incorporated the changes to the Safety Analysis Report that were previously referenced in CoC No. 9239.

CRITICALITY

1.0 Criticality Evaluation

In conjunction with the renewal of CoC No. 9239, for the Model Nos. MCC-3, MCC-4, and MCC-5 shipping containers, the applicant requested a revision to the certificate to change the loading pattern for the 15x15 BW fuel assemblies and change the specification of the VVER-1000 fuel assemblies to include annular pellets at the ends of the active fuel region. Both of these changes had previously been approved in letter authorizations for a limited period of time, for lower enrichments (3.5 weight percent (wt%) for the BW fuel and 3.8 wt% for the VVER fuel), and for a small number of packages (2 and 3, respectively) per shipment. Consequently, the applicant was requested to provide more general analyses which showed that the proposal was justifiable for enrichments up to the higher limits requested and for the maximum number of packages to be authorized per shipment.

1.1 Description of Criticality Design

The transportation packages authorized in this certificate exist in three configurations, viz., Model Nos. MCC-3, MCC-4 and MCC-5. These packages can hold two fresh PWR fuel assemblies in a side-by-side arrangement on a "strongback" frame. As part of the criticality control measures, all package configurations have vertical poison plates mounted permanently between the two assembly locations. Model No. MCC-4 is essentially a longer version of Model No. MCC-3. Shipment of fuel in the Model Nos. MCC-3 and MCC-4 is authorized with only the vertical poison plates. However, for enrichments over 4.65 wt% (for 14x14, 15x15, 16x16, and 17x17 OFA fuel assemblies), or 4.85 wt% (for the 17x17 STD/XL fuel assemblies) up to 5.0 wt%, the both models must also be fitted with horizontal poison plates under each of the two fuel assemblies being transported.

The Model No. MCC-5 is permanently equipped with both vertical and horizontal poison plates. The VVER-1000 fuel assemblies are hexagonal in shape and can be shipped only in the Model No. MCC-5. For VVER-1000 fuel assemblies the maximum allowed enrichment is 4.8 wt%.

In the interest of expediency and in view of current production needs, analyses for the 15x15 BW and the VVER-1000 fuel assemblies were provided for only a maximum enrichment of 4.65 wt% and 4.80 wt%, respectively. The applicant stated that a separate request will be submitted in the future if authorization to ship higher enrichments is needed.

1.2 Fissile Material Contents

The contents addressed in this approval are the 15x15 BW fuel assembly as described in Table 1-5.2 of the SAR with a fissile content of 24 kgs of ²³⁵U per assembly and the VVER-1000 fuel assembly as described in Table 1-5.5 of the SAR with a fissile content of 26 kgs of ²³⁵U per assembly.

The loading pattern of the 15x15 BW was changed from a 21 thimble and instrument tube configuration to a 17 tube configuration as shown in Drawing No. 6481E15, Rev. 4, in the SAR.

2.0 General Considerations

Since the previous limited time letter approvals were based on a lower fuel enrichment, a limit of one shipment, and a reduced number of packages in the shipment, the applicant provided more generalized analyses to justify the contents for enrichments up to 4.65 wt% for the 15x15 BW fuel assemblies and 4.80 wt% for the VVER-1000 fuel assemblies.

2.1 Model Configuration

The applicant evaluated an infinite array of packages flooded with water to bound both the single package and package array cases under normal and hypothetical accident conditions. The model configurations are the same as provided in the previously approved applications. The model descriptions were reviewed and found to be consistent with the specifications provided in the SAR.

2.2 Material Properties

The material properties and compositions used in the criticality analysis remained unchanged.

2.3 Computer Codes and Cross-Section Libraries

The applicant used the CSAS module with KENO 2.5 in the SCALE suite of codes developed by Oak Ridge National Laboratory.

2.4 Demonstration of Maximum Reactivity

Throughout the entire analysis, the applicant reported adjusted values of k_{eff} where the adjusted value equaled the calculated value plus an adjustment for code bias and two times the standard deviation of the statistical uncertainty. The results of the applicant's analyses produced values of k_{eff} , as adjusted, that are below the acceptance level of 0.95 to demonstrate an adequate degree of sub-criticality.

3.0 Benchmark Evaluations

The applicant's benchmark analysis is unchanged from previous submittals.

4.0 Evaluation Findings

During the review, staff noted that the applicant's analysis for partial moderator density conditions did not address densities in the region between a relative maximum at low densities below 6% and the upper end of full density water. Staff performed an analysis

of the intermediate density range and determined that full density water is the condition which maximizes k_{eff} over all densities.

Also during the review, staff found that some of the previous example input files provided by the applicant had an error in the specification of the MORE DATA feature used in the calculations. Corrected files and analyses were provided. The results of the corrected analyses showed only a small change in the calculated values and did not result in a change of the previous conclusions.

Staff performed independent calculations for the 15x15 BW and VVER-1000 contents. These calculations used the newer SCALE5 code without relying on the MORE DATA feature and compared results for both 27- and 44-group cross section libraries. The calculated results of k_{eff} for all cases, as adjusted, fell below the acceptance limit of 0.95.

Based on the representations and information supplied by the applicant, and the review and calculations performed by staff, staff finds reasonable assurance that the proposed amendments meet the requirements of 10 CFR Part 71.

CONCLUSION

In response to the applicant's request, CoC No. 9239 has been revised as follows: (1) the CoC has been renewed for a five year term that expires on March 31, 2012, (2) the CoC has been revised to allow a change in the loading pattern for the 15x15 BW fuel assemblies, and (3) the CoC has been revised to change the specification of the VVER-1000 fuel assemblies to include annular pellets at the ends of the active fuel region. The applicant, to support its request, submitted a consolidated application for the package.

Based on the statements and representations in the application, the staff finds that these changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9239, Revision No. 15,
on February 2, 2007.